DOCUMENT RESUME

ED 391 040 CE 070 612

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TITLE Vocational Education Influence on Underemployment in Taiwan, Republic of China.
PUB DATE 2 Dec 95
NOTE 23p.; Paper presented at the Annual Meeting of the International Vocational Education and Training Association, American Vocational Association Convention (Denver, CO, December 2, 1995).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Employed Women; Females; Foreign Countries; Males; *Outcomes of Education; Secondary Education; *Underemployment; Unemployment; *Vocational Education; *Vocational Followup
IDENTIFIERS *Taiwan

ABSTRACT

A study to identify the influence of vocational education on an individual's underemployment analyzed data from a Taiwan labor use survey conducted in May 1993. Data were restricted to 9,415 respondents who were currently employed, aged 20-65, and not in the army; who had participated in general or vocational high school education; and for whom all data were complete. Findings indicated the following: males found full-time employment more easily; male vocational business high school participants were less likely to be underemployed than male general high school participants; younger people were less likely to be underemployed than those above age 40; and married women had a higher probability of being underemployed than single women, whereas married men had a higher probability of becoming fully employed than single men. Living in a region with a high unemployment rate made female and general high school participants more likely to become underemployed. Women or general high school participants who lived in a municipality were more likely to be fully employed than their reference groups who lived in rural areas. The probability of being underemployed was higher for workers in the service sector than those in the industry sector. The probability of being fully employed was higher for workers in a large company. Men or general high school participants who had changed jobs in the last year had a higher probability of becoming underemployed. (Appendixes include 11 references and 5 data tables.) (YLB)

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Vocational Education Influence on Underemployment in Taiwan, Republic of China

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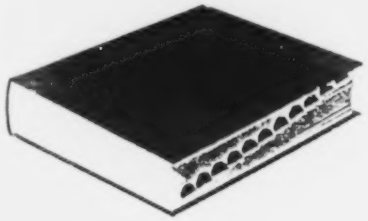

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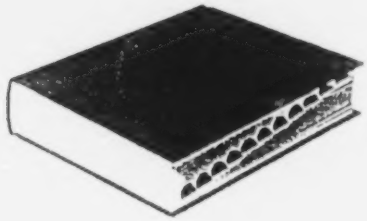

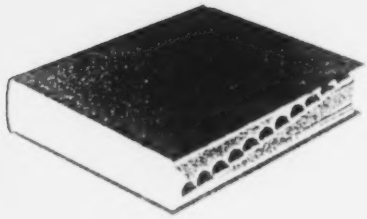

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1995 Meeting of American
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Denver, Colorado
December, 2nd, 1995

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Vocational Education Influence on Underemployment in Taiwan, Republic of China

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Abstract

The purpose of this study is trying to find the influence of vocational education on individual's underemployment. We analyzed data from an islandwide labor utilization survey conducted in May, 1993, by the ODGBAS (1994). The data was restricted to 9,415 respondents who were currently employed, aged 20 to 65, not in the army, participated in general or vocational high school education, and for whom complete all the data in my model of underemployment.

Averagely, for the 9,415 samples, 87.3%, 5.5%, and 7.2% was in the situation of full employment, underemployment, and unpaid family worker, respectively. Using three categorical logistic regression to analyze the data, and making full employed people as the reference group, we have got the results as follows:

1. Male was easier to become fully employed than female.
2. Male vocational business high school participants were less likely to be underemployed than male general high school participants.
3. Younger people were less likely to be underemployed than those above forties.
4. Married women had higher probability to be underemployed than single women, while married men had higher probability to become full employed than single men.
5. Living in the region with high unemployment rate would make female or general high school participants become underemployed easier than their reference groups.
6. Women or general high school participants who lived in municipality were more likely to be full employed than their reference groups who lived in the rural area.
7. The probability of being underemployed was higher for workers in the service sector than those in the industry sector.
8. The probability of being full employed was higher for workers in the large scale company.
9. Operators were easily full employed than those in the occupation of AAHFF; but, they were more likely to be underemployed than those who worked in the occupation of service, clerical, and sales.

10. Employers were less likely to become underemployed than private paid employees.
11. Men or general high school participants who had changed more jobs in last year had higher probability to become underemployed than their reference groups; meanwhile, they would not be likely to become unpaid family workers.
12. Women or general high school participants with longer tenure would have lower probability to be underemployed than their reference groups; yet, they were easily to turn to unpaid family workers.
13. Females with more children were easily to become unpaid family workers.

Introduction

Population growth rate has been reduced greatly in recent ten years on Taiwan, Republic of China (ROC). Accompanied is the decreasing labor force growth rate. However, economy in this country still booms very well, hence the demand for labors is over the supply (Wu, 1990, p.61). In addition, diligent working habit has also been changed islandwide, then labor force participation rate goes down in these five years. Therefore, this kind of inbalance between demand and supply for labors goes worse by worse. Finally, labor shortage problem forces the government to agree to immigrate more about 180,000 foreign labors from southeastern countries during these four years.

Except for the two international oil crises in 1970s, unemployment rate in the ROC has been lower than 2% during the last thirty years. This tells us that we do not have the problem for unemployment. Nevertheless, the reports from the islandwide labor utilization survey by the Office of the Direcotorate-General of Budget, Accounting and Statistics (ODGBAS), Executive Yuan, ROC (1983 to 1992) have revealed that more than 20% of employed people were underemployed. Moreover, underemployment rate of vocational high school or junior college participants has been higher than 30%. These information from labor market has awaken us that this country not only faces the problem of labor shortage, but also the problem of labor utilization (Kuo, 1993).

Researchers found that most shortage labors are basic level workers (Wu & Chang, 1989). The main goal of vocational high school in the ROC is training young people to be employable basic level skilled workers. Like most Americans want to know how good vocational education have been performed, people in the ROC also enthusiastically want to know whether vocational education has played nice role for its goal--training the youth to become employable basic skilled workers and be utilized adequately.

For the above reasons, this study will compare the underemployment differences between general and vocational high school participants. Then provide suitable recommendations to the ROC Education Ministry for the development of vocational high school education. As follows, we will review literatures which related to labor utilization, describe analyzed data source and sample characteristics, introduce the analyzed statistical method, show the findings, and make conclusions and recommendations.

Literature Review

Measurement of Underemployment

Basically, labor force has the following three status: out of labor force, employed, and unemployed. Those who are employed or unemployed can be named as in the labor force. In the ROC, matched with the education system, we define the labor force as those individuals who are over 15 years old. However, unemployed individual means that one who is looking for work or awaiting recall. But if an individual who has no desire to seek work then this person is defined as out of labor force.

Although unemployment statistics shows us some important information about undesirable not working, it still hides some important labor market information (Clogg, 1979; Hauser, 1974; Wu & Hsieh, 1988). Hauser (1974, p.3) found that underemployment might often be more important than unemployment in developing nations and self-employed cannot be unemployed because they are not employees. For solving the above deficiency of labor force framework, Hauser (1974) had recommended a better and integrated labor utilization framwork to substitute.

In order to define underemployment, the following supplementary information is required: education and training, and income or a proxy for income. The above supplementary information and standard labor force information permits us to classify people in the labor force as five categories. They are: utilized adequately (full employment), unemployment, inadequate worked hours, income inclining to low level, and mismatched occupation and education attainment. Except for the first category, all the later four categories are classified as utilized inadequately. In addition to unemployed individuals, people who are in either of the other three categories of inadequate utilization is named as underemployment.

In the ROC, ODGBAS (1990, p.37) has employed the labor utilization framework by Hauser. Matching with the ROC social background, ODGBAS has only made a tiny change to Hauser's framework.

Many researchers have pointed out that the category of mismatched occupation and education attainment has no objective standard (Shu & Huang, 1993, p. 206). Therefore, a lot of researchers (Hauan, 1991; Allan & Steffensmeier, 1989; Wu & Hsieh, 1988) canceled out this occupation and education matching category from their studies of underemployment.

In this study, like the above researchers, we do not put the category of mismatching occupation and education attainment into the variable of underemployment. We have classified an employed people into either of the following three types: underemployed worker (include undesired part-time worker or low pay worker), unpaid family worker, and full employed worker. Additionally, the cutting point of low pay worker is the minimun wage rate (12,365 NT$ per month in 1992, which is about 500 US$ per month) in Taiwan, ROC.

Important Factors for the Influence on Underemployment

According to the theory of human capital, dual labor market, internal labor market, and discrimination, they have found consistently that people who own the following characteristics are more likely to be underemployed: female, teenagers, with health limitation, minorities, changing job frequently, with shorter tenure, low education attainment. As follows, we will review four types of variables: educational, demographic, environmental, and working experience variables which were found that might make an individual to be underemployed in the empirical studies.

1. Education Variable

Related studies of labor utilization usually see education variable as demographic variable. But the purpose of this study is trying to find the relationship between education attainment and labor utilization. Thus, this study regards "education" variable as one specific category.

Till recently, very few papers have focused on the relations between high school participation and labor utilization in the labor market. Some papers employed descriptive statistical reports from the survey of labor utilization by the ODGBAS in years past and infered that vocational high school participants have higher underemployment rate than that of general high school participants (Feng, 1993; Shih, 1991). But, the low pay measurement on these reports is different from this study. Furthermore, their

measurement for mismatching occupation and education attainment is looser for those general high school participants. Therefore, it is necessary to do a further inquiry for the above mentioned conclusions.

Wang (1994) had designed a questionaire and investigated the above interesting topic. Through his study, he classified labor utilization into three types like out of the labor force, inadequate labor utilization, and adequate labor utilization. No matter for the short or long term, this research found that the probabilities in both "out of the labor force" and "adequate labor utilization" for vocational high school graduates perform better than those for general high school graduates during the past ten years. Yet, along with their graduation periods, such kind of effect has diminished.

2. Demographic variable

The traditional family role for females make them much easier break their job career, and less join as the union member; hence compared with males, they have higher probability to be utilized inadequately (Wang, 1994; Wu & Hsieh, 1988; Blau & Ferber, 1986; Clogg &Shockley, 1985).

Many studies found that prime age (25-54 years old) people are more likely to be utilized adequately than young or older labors (Hauan, 1991; Wu & Hsieh, 1988; Glyder, 1977).

Being married or not has significantly different influence on both men and women. Researches found that married women have heavier children and economic burden than single women, then they have higher probability to be underemployed than single women (Hauan, 1991; Tienda & Glass, 1985). However, married men with more family responsibility, must work harder, then become full employed workers easier than single men (Pencavel, 1986; Thurow, 1983).

Perhaps this is related with traditional concept of family roles --husband takes care of outside chores and wife takes care of the inside chores. Empirical studies found that the number with children under six years old has a negative and a positive effect on the husband's and wife's underemployment, respectively (Chang, 1992; Hauan, 1991; Johnson & Skinner, 1988).

3. Environmental variable

The theory of situation in management found that decisions of human beings rely on the environmental factors. Indeed, this fact is also true for an individual to make

choice in the behavior of labor utilization.

The regions with higher local unemployment rate can offer few job opportunities, hence people who live in these regions will turn out to have a higher chance of being underemployed (Dreze, 1991; Lichter & Costanza, 1987).

In the urban area, there are more occupations in the third sector (service sector) than those in the rural area (Kao, 1981). Through the supply and demand in the labor market, empirical studies found that people who live in the urban area are more likely to be full employed than those who live in the rural area. (Hauan, 1991; lichter, 1989).

4. Working Experience Variable

According to Glyde's paper (1977), young people change their job more frequently and cumulate shorter working experience than adults, these make them easier to be underemployed than adults.

Theoretically, Service sector grows rapidly and provides more part-time and low pay jobs, causes more people who work in the service secor in the situation of underemployment (Tigges & Tootle, 1990). Empirical fingings also support this kind of saying (Hauan, 1991; Tigges & Tootle, 1990). Besides, in most enterprises, tenure represnts better job placement and better payment (Wang, 1994; Shapiro, 1984). Therefore, people with longer tenure have lower probability to be underemployed. Finally, women who work in the large scale companies are less likely to be hired in the condition of underemployment (Hauan, 1991).

Sample Charateristics

We analyze data from an islandwide labor utilization survey conducted in May, 1993, by the ODGBAS (1994). The survey utilized a national probability sample of households. The sample consisted of 59,563 individuals who are 15 years old and over. However, the analysis is restricted to 9,415 respondents who were currently employed, aged 20 to 65, not in the army, participated in general or vocational high school education, and for whom complete all the data in my model of underemployment.

Averagely, for the 9,415 samples, 87.3%, 5.5%, and 7.2% was in the situation of full employment, underemployment, and unpaid family worker, respectively. However, more men were in the status of full employment than women; more women are in the condition of underemployment and unpaid family worker than men.

Sixty percent of men were industrial education participants; 49.6% of women were business education paricipants, and general high school participants occupied about 27% of the sample. About 63% of the sample worked in the sector of industry. Local unemployment rate was 1.5383%, and their average age was 32.4218 years old. Finally, the average tenure was 5.5816 years, men's tenure was 1.64 years longer than women's. More detailed means and standard deviations of every variable in the model of underemployment can be found in the appendix.

Analytic Method

The purpose of this study is trying to find the influence of vocational education on individual's underemployment. Since in this study, labor utilization for employed people have three categories. If using the regression of linear probability to analyze, it will violate three of the seven assumptions of regression (Studenmund & Cassiddy, 1987, P.174): (1) variance of error terms is not constant, (2)distribution of error terms is not normal, (3) expected value might be over the limitation between zero and one. Thus, when we want to analyze the regression with categorical dependent variable, it is better to use the probit or logistic regression. For the convenience to get the statistical package, this study employs the Catmod procedure in SAS package to do the three categrical dependent variable regression.

Multi-logistic regression is an extention for two categorical logistic regression. Cumulative logistic probability function is as follows:

$$P_i = F(BX_i) = \frac{1}{1+e^{-BX_i}}$$

e is the base of natural logarithms, which is approximately 2.718. P_i represents the probability that an individual will make a certain choice, given the X_i vector of independent variables. B is the vector of coefficients for logistic regression. If the dependent variable has two categories (ex: underemployed or not), then $P_{1i} + P_{0i} = 1$. P_{1i} represents the probabilty that an individual will be underemployed. P_{0i} is the probability that an individual will be full employed. Therefore, the above equation becomes

$$(1+e^{-BX_i})P_i = 1$$

$$e^{-BX_i} = \frac{1}{P_i} - 1 = \frac{1 - P_i}{P_i}$$

Since $e^{-BX_i} = \frac{1}{e^{BX_i}}$, hence

$$e^{BX_i} = \frac{P_i}{1 - P_i}$$

$$BX_i = \log(\frac{P_i}{1 - P_i})$$

However, when the dependent variable has more then two categories, its analytic method is a little like multiple regression. Make one specific category as the reference group (Aldrich & Nelson, 1984; Pindych & Rubinfeld, 1981; Wang,1989). Taking underemployment measurement as instance, we use 1,2,3, represent worker of "underemployment", "unpaid family", and "full employment". Because total probability of the three choices is 1 ($P_{1i} + P_{2i} + P_{3i} = 1$), thus, we can obtain two groups of logistic regressions as follows:

$$\log(\frac{P_1}{P_3}) = B_{13}X$$

$$\log(\frac{P_2}{P_3}) = B_{23}X$$

If we get the positive B_{13}, it means this independent vector X has a positive influence on an individual being underemployment. Similarly, if B_{23} is positive, then vector X makes an individual more likely to be unpaid family worker. If we want to find the equation of $\log\frac{p_1}{p_2}$, we could get if through calculating ($\log\frac{P_1}{P_3} - \log\frac{P_2}{P_3}$) . The result shows as:

$$\log\frac{p_1}{p_2} = \log\frac{P_1}{P_3} - \log\frac{P_2}{P_3} = (B_{13} - B_{23})X = B_{12}X$$

If B_{12} is positive, then it means that vector X makes an individual more likely be "underemployed" than be unpaid family worker.

Findings

We measured employed people as the following three categories: underemployed, unpaid family worker, and full employed. Using three categorical logistic regression to analyze the data, and making full employed people as the reference group, we have got the results as follows.

Total Sample Results

Compared the situation of underemployment with full employment, while other variables kept as constant, table 1 tells us that women were more likely to be underemployed than men. For vocational education, only the other vocational high school participants had a significant finding--made a higher probability to be underemployed than general high school participants. For the variable of age, 25-29 years, or 30-39 years old people were less likely than peolpe who were 40 years old and over to be underemployed. Besides, married people had higher underemployment rate than single people.

Insert Table 1 Here

People's living environment had the following findings: lived in high local unemployment rate area or rural area had higher probability to be underemployed than poeple living in the area of low local unemployment rate or special municipalities--- Taipei and Kaohsiung.

People working in the first (industry) sector or large scale of company could reduce the probability to be underemployed than those working in the service sector or 1-9 persons' company. The occupation of clerical, sales, and service made the significant influence on reducing people to be underemployed than the occupation of operator; while the occupation of agricultural, animal, husbandary, forestry workers, and fishermen (AAHFF) made an increasing influence. Additionally, employer had a significant effect on reducing the rate of underemployment than private paid employee. Finally, people who had changed more jobs last year might have higher probability to be underemployed.

Compared the situation of unpaid family worker with full employment, men had less chance to be unpaid family

worker than women. Agricultural and nursing vocational high school participants were less and more likely to be unpaid family worker than general high school participants, respectively. However, age had not found any statistically significant influence on this kind of comparison. Reasonably, married individual had higher probability to be unpaid family worker.

People who lived in the special municipality on the island were significantly less likely to be unpaid family worker than those who lived in the rural area. Workers in the industry sector were more likely to be unpaid family worker than those worked in the service sector. Excluding the company scale of 50-99 persons, the smaller the company scale was the higher probabilty that their workers would be unpaid family worker. In addition, no unpaid family workers in the occupation of professional, and administrative; and in the employed status of employer, owner account worker, private paid employee, and government employee, we only found that the occupation of service and AAHFF had higher probabilty to be unpaid family worker than operator. Moreover, people who had changed more jobs last year might have lower probability to be unpaid family worker. Finally, the longer the tenure that an individual had the higher probability that one would be the unpaid family worker.

Female Sample Results

Comparing the situation of underemployment with full employment, while other variables kept as constant, table 2 shows: for females, only the other vocational high school participants had a significant finding--made a higher probability to be underemployed than general high school participants. For the variable of age, 25-29 years, or 30-39 years old women were less likely than women who were 40 years old and over to be underemployed. Besides, married women had higher underemployment rate than single women.

Insert Table 2 Here

For the environmental variables, we found: women who lived in high local unemployment rate area or rural area had higher probability to be underemployed than those living in the area of low local unemployment rate or special municipalities of Taiwan.

Women who worked in the industry sector or large scale of company could reduce the probability to be underemployed than those who worked in the service sector or 1-9 persons company. Except the occupation of AAHFF, women in all the

other five occupations were significantly less likely to be underemployed than women in the occupation of operator. Additionally, only women in the government employee had a significant effect on reducing underemployment probability than female private paid employees. Moreover, with longer tenure could significantly reduce the probability of being underemployed for women.

Compared the situation of unpaid family worker with full employment for females, only the nursing vocational high school participants were more likely to be unpaid family worker than general high school participants. However, age had not found any statistically significant influence on this kind of comparison either. Reasonably, married women had higher probability to be unpaid family worker than single women.

Women who lived in the special municipality on Taiwan were significantly less likely to be unpaid family worker than those who lived in the rural area. Women worked in the industry sector were more likely to be unpaid family worker than those worked in the service sector. Excluding the company scale of 50-99 persons without unpaid female family worker, the smaller the company scale was the higher the probabilty that their female workers would be unpaid family worker. The same as the total sample, there was no unpaid family workers in the occupation of professional, and administrative; and in the employed status of employer, owner account worker, private paid employee, and government employee, we could only found that the occupation of service and AAHFF had higher probabilty to be unpaid family worker than operator for females. Moreover, women with longer tenure had a significantly higher probability to be the unpaid family worker. Like most people's expectations, the more children a family had the higher probability that a woman would be the unpaid family worker.

Male Sample Results

Compared the situation of underemployment with full employment, while other variables kept as constant, table 3 tells us that only the vocational business high school participants had a significant influence on the probability of being underemployed, they were less likely to be underemployed than their reference group. For the variable of age, 25-29 years, or 30-39 years old men were less likely than men who were 40 years old and over to be underemployed. Interestingly, as our wish, married men with more family burden, then had lower underemployment rate than single men.

Insert Table 3 Here

Two environmental variables had not found any significant effect on men's underemployment. The same as women, men working in the industry sector or large scale of company could reduce the probability of being underemployed than those working in the service sector or 1-9 persons company. Except the men with the occupation of AAHFF had the significant influence on increasing men to be underemployed than the occupation of operator; all the other occupations had no significant difference. Additionally, both employer and government employee had significant effect on reducing men's underemployment probability than private paid employee. Moreover, those men who had changed more jobs last year might have higher probability to be underemployed than those men who had less job changing.

Compared the situation of unpaid family worker with full employment, the type of high school education made no significant influence on being unpaid family worker or full employment for men. However, for the variable of age, 20-24 years, or 25-29 years old men were more likely than men who were 40 years old and over to be unpaid family worker. Moreover, marital status had no statistically significant effect on men's probability to be unpaid family worker.

Those men who lived in the area with higher unemployment rate had a negatively significant effect on being unpaid family worker than those who lived in the area with lower unemployment rate. The type of industry had made no significant effect on being unpaid family worker for men. In addition, there was no male unpaid family workers in the occupation of professional, and administrative; and in the employed status of employer, owner account worker, private paid employee, and government employee, we only found that the occupation of service and AAHFF had higher probabilty to be unpaid family worker than operator for men. Moreover, men who had changed more jobs last year might have lower probability of being unpaid family worker. Finally, the longer the tenure that a man had the higher probability that one would be unpaid family worker.

Conclusions and Recommendations

According to the previous findings of this study, we can summarize them as follows:

1. Male was easier to become fully employed than female.
2. Male vocational business high school participants were less likely to be underemployed than male general high school participants.
3. Younger people (20-29 years old) were less likely to be underemployed than those above forties.
4. Married women had higher probability to be underemployed than single women, while married men had higher probability to become full employed than single men.
5. Living in the region with high unemployment rate would make female or general high school participants become underemployed easier than their reference groups.
6. Women or general high school participants who lived in municipality were more likely to be full employed than their reference groups who lived in the rural area.
7. The probability of being underemployed was higher for workers in the service sector than those in the industry sector.
8. The probability of being full employed was higher for workers in the large scale company.
9. Operators were easily full employed than those in the occupation of AAHFF; but, they were more likely to be underemployed than those who worked in the occupation of service, clerical, and sales.
10. Employers were less likely to become underemployed than private paid employees.
11. Men or general high school participants who had changed more jobs in last year had higher probability to become underemployed than their reference groups; meanwhile, they would not be likely to become unpaid family workers.
12. Women or general high school participants with longer tenure would have lower probability to be underemployed than their reference groups; yet, they were easily to turn to unpaid family workers.
13. Females with more children were easily to become unpaid family workers.

Based on the goals of this research, findings and conclusions, and the literature review, we will make the following recommendations with the focus on the individual, vocational education, enterprises, and further study.

1. Recommendations toward Individuals

(1) Enhance the knowledge and skills for career planning and make a good preparation for personal career development--we found that men or general high school participants with more job changing in last year would easily become underemployed. If an individual can seize the opportunities for learning the knowledge and skills of career, make better career planning, and get ready for better career development; then, every changing job can match the individual's career

development which is one kind of changing for career-promotion. Thus, this would avoid the condition that changing to the underemployed jobs and have the quit intention, and again changing to another underemployed job as our research discovered. If this cycle goes on, will it be advantageous for an individual's self fulfilling.

(2) If necessarily, moving from rural area to the municipality on Taiwan can increase the probability of being fully employed for female and general high school participants--our research discovered that the probability of full employment for female and general high school participants in the municipality was higher than those in the rural area. Owing to more working opportunities and various types of jobs in big city, we may consider geographical migration in order to be fully employed for those people who dwell in the long-term underemployed countryside.

2. Recommendations toward Vocational Edcation

(1) We should consider the supply and demand in labor market simultaneously, review the quality and quantity of basic skilled workers--this research discovered that there were no significant underemployment difference between all types of vocational high school and general high school participants, exclude vocational business high school male participants were less likely to be underemployed than male general high school participants. From this point, we can apprehend that the performance of vocational education is not worse than general education.

While the Ministry of Education in the ROC will make reform the education system, we should not consider only "the public's needs toward general education" and neglect "the necessity of labor market in society toward education". The authority should consider both the supply and demand in labor market, the public's necessity toward education, effectiveness in educational resources, and to make the best advantageous policy for labor resources in the ROC.

(2) To raise a large amount investment on vocational education--labor shortage in basic skilled level is the hot issue which most people concerned greatly on Taiwan. At this moment, the function of vocational education is becomeing more and more important. However, the expenditure of education showed that the unit cost per year of general high school student was 1.7 times of the vocational high school student during the last 23 years in the ROC. If we want to pay real attention to the supply of basic skilled workers, the government should invest more money on vocation high school education than it used to do.

3. Recommendations toward Enterprises

(1) Enterprises should pay more attention to increase the effectiveness for the development and management of their human resources--with the age of rapid changing in technology and job contents, underemployment is an unavoidable fact (Dreze, 1991). In order to face this kind of situation, enterprises ought to develop their employees' second specialty, reinforce the human resources management, and change employees' negative altitude on underemployment; make the negative influence of underemployment be as low as possible.

(2) Expand the company to economic scale and create more job opportunities for full employment--this study found that labors in the larger scale company were less likely to be underemployed. Since most companies in the ROC are small or medium size, this might be the main reason for the high rate of underemployment on this island. If most small or medium companies can merge into large economic scale companies, they could have more budget and new technology to create more full employed job opportunities.

4. Recommendations toward Further Study

Make more effort on the objective measurement of "mismatched occupation and education attainment"--Since a lot of researchers have mentioned that the measurement of mismatched occupation and education attainment was not objective. This made the studies of labor utilization have no identical standard to make comparison. It deserves social scientists to make effort on setting up a new, acceptable, and objective standard.

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Appendix

Table A1 Frequency Distribuution of the Sample

Variable	Total		Female		Male	
	f	%	f	%	f	%
Labor Utilization:						
Underemployment	522	5.5	325	9.0	197	3.4
Unpaid Family Worker	677	7.2	398	11.0	279	4.8
Full Employment	8216	87.3	2894	80.0	5332	91.8
High School:						
Ind. Voc.	3138	33.2	250	6.9	2888	49.6
Bus. Voc.	2860	30.2	2206	60.7	654	11.2
Agr. Voc.	495	5.2	71	2.0	424	7.3
Med. Voc.	111	1.2	79	2.2	32	0.5
Other Voc.	291	3.1	160	4.4	131	2.2
General	2566	27.1	871	23.9	1695	29.1
Sex:						
Female	3637	38.4				
Male	5824	61.6				
Age:						
20-24yr.	2004	21.2	1151	31.6	853	14.6
25-29yr.	2278	24.1	894	24.6	1384	23.8
30-39yr.	3362	35.5	1170	32.2	2192	37.6
40yr.&Over	1817	19.2	422	11.2	1395	23.9
Marrtal:						
Married	5773	61.0	1906	52.4	3867	66.4
Single	3688	39.0	1731	47.6	1957	33.6
County:						
Municipality	1648	17.4	681	18.7	967	16.6
Big City	3352	35.4	1356	37.3	1996	34.3
Rural Area	4461	47.2	1600	44.0	2861	49.1
Industry:						
First	524	5.5	95	2.6	429	7.4
Second	5959	63.0	2147	59.0	3812	65.5
Third	2978	31.5	1395	38.4	1583	27.2
Occupation:						
Operator	3273	34.6	679	18.7	2594	7.4
Agr.and etc	481	5.1	86	2.4	395	6.8
Service	1617	17.1	741	20.4	876	15.0
Sales	1564	16.5	1212	33.3	352	6.0
Clerical	1830	19.3	726	20.0	1104	19.0
Administrative	196	2.1	138	3.8	58	1.0
Professional	500	5.3	55	1.5	445	7.6

Cont. Table A1

Company Scale:						
1-9 Persons	4365	46.1	2791	47.9	2791	47.9
10-29 Persons	1568	16.6	634	17.4	934	16.0
30-49 Persons	673	7.1	314	8.6	359	6.2
50-99 Persons	571	6.0	261	7.2	310	5.3
over 100 Persons	2284	24.1	854	23.5	1430	24.6
Status:						
Employer	551	5.8	66	1.8	485	8.3
Own-account	1120	11.8	196	5.4	924	15.9
Govnt. Employee	1276	13.5	419	11.5	857	14.7
Private Employee	5837	61.7	2558	70.3	3279	56.3
Unpaid Family worker	677	7.2	398	11.0	279	4.8

Table A2 Means and Standard Deviations for the Sample

	Total		Female		Male	
Variable	M	SD	M	SD	M	SD
Age	32.4218	9.12	29.7140	7.67	34.1128	9.54
Local Unemp.	1.5383	0.52	1.5589	0.52	1.5255	0.53
Num. Job Change	0.1047	0..34	0.1149	0.37	0.0983	0.33
Tenure	5.5816	6.12	4.5508	4.98	6.2253	6.66
Num. Dept. <6yr.	——	——	0.2952	0.62	——	——
Num. Dept. ≥6yr.	——	——	0.6293	1.08	——	——
Sample Size	9415		3617		5798	

Table 1. Total sample for three categorical logistic regression of underemployment

	Under / Full		Unpaid / Full	
Variable	B	χ^2	B	χ^2
Intercept	-0.9138	9.56***	-1.7557	23.39***
Male	-1.8084	157.76***	-1.1027	47.95***
Ind. Voc.	0.0315	0.04	0.1888	1.22
Bus. Voc.	0.0238	2.42	0.1078	0.53
Agr. Voc.	0.3426	2.42	-0.7508	4.22***
Med. Voc.	-0.8297	2.17	1.5805	5.62**
Other Voc.	0.6069	6.96***	-0.2438	0.44
20-24 Yr.	-0.0369	0.03	0.2848	1.25
25-29 Yr.	-0.5786	9.12***	0.2671	1.41
30-39 yr.	-0.5392	11.92***	0.1549	0.62
Single	-0.3104	5.27**	-1.1163	56.32***
Local Unemp.	0.3467	7.94***	-0.1876	1.67
Municipality	-0.6295	13.62***	-0.4829	6.37***
Big City	-0.0185	0.03	0.0605	0.21
Ind. Sector	-0.7337	0.66	0.5359	0.38
Serv. Sector	-0.2480	4.24**	0.7567	23.47***
10-29 Persons	-0.7071	22.73***	-2.4470	23.47***
30-49 Persons	-1.0680	21.29***	-4.0541	104.45***
50-99 Persons	-1.2030	21.71***		
Over 100 Persons	-2.0149	52.84***	-5.5319	30.23***
Professional	-0.6808	2.32		
Administrative	-0.4375	1.72		
Clerical	-1.1029	37.18***	-0.1618	0.66
Sales	-0.7148	19.84***	0.0094	0.01
Service	-0.4713	9.80***	1.5069	99.20***
Agr. and etc.	2.5826	8.17***	5.2168	34.16***
Employer	-2.3319	14.40***		
Own-account	0.1443	0.80		
Govnt. Employee	0.3584	1.03		
Num. Job Change	0.2694	5.68***	-0.5286	7.46***
Tenure	-0.0159	2.22	0.0753	25.50***
Sample Size	9415			
-2 Log Likelihood	5361.22***			
Average of P1	5.5%			
Average of P2	7.2%			
Average of P3	87.3%			

***=p<0.01 **=p<0.05 *=p<0.10

P1 , P2, and P3 represent underemployment, unpaid family worker,and full employment, respectively.

Table 2. Female sample for three categorical logistic regression of underemployment

	Under / Full		Unpaid / Full	
Variable	B	x^2	B	x^2
Intercept	-0.5344	9.56***	-1.7557	16.55***
Ind. Voc.	0.2564	0.90	0.1688	0.21
Bas. Voc.	0.1513	0.910	-0.0863	0.21
Agr. Voc.	0.2879	0.46	-0.6851	1.04
Med. Voc.	-0.6121	0.89	1.6967	4.17**
Other Voc.	0.7356	7.43***	-0.3894	0.66
20-24 Yr.	-0.1197	0.14	0.1690	0.19
25-29 Yr.	-0.4276	1.95	0.1125	0.10
30-39 yr.	-0.5707	5.28***	0.2009	0.54
Single	-0.4608	4.98**	-1.8699	46.96***
Local Unemp.	0.4859	9.60***	0.2014	0.98
Municipality	-1.0166	20.80***	-0.8997	12.37***
Big City	-0.1814	1.55	-0.1251	0.44
Ind. Sector	-1.2378	0.49	0.7642	0.34
Serv. Sector	-0.3250	4.78**	0.8884	18.93***
10-29 Persons	-0.6776	15.50***	-2.5112	66.87***
30-49 Persons	-1.1621	19.44***	-3.7558	26.53***
50-99 Persons	-1.4115	21.79***		
Over 100 Persons	-2.4668	47.06***	-5.4961	29.20***
Professional	-1.9130	3.33*		
Administrative	-0.9404	5.96**		
Clerical	-1.5810	49.75***	0.4844	2.88*
Sales	-1.0115	31.95***	-0.2594	1.03
Agr. and etc.	-0.9298	24.06***	1.1280	25.67***
Employer	1.9906	1.26	5.5603	14.25***
Own-account	0.0714	0.09		
Govnt. Employee	1.1077	6.46***		
Num. Job Change	0.1777	1.56	-0.1848	0.58
Tenure	-0.0823	14.36***	0.1133	27.81***
Num. Dept. <6Yr.	0.1281	1.00	0.3890	8.37***
Num. Dept. >=6Yr.	1.1415	2.50	0.2589	7.12***
Sample Size	3617			
-2 Log Likelihood	2852.52***			
Average of P1	9.0%			
Average of P2	11.0%			
Average of P3	80.0%			

***=p<0.01 **=p<0.05 *=p<0.10

P1 , P2, and P3 represent underemployment, unpaid family worker,and full employment, respectively.

Table 3. Male sample for three categorical logistic regression of underemployment

	Under / Full		Unpaid / Full	
Variable	B	x^2	B	x^2
Intercept	-3.1090	44.18***	-2.6119	16.55***
Ind. Voc.	-0.0572	0.09	0.1058	0.21
Bus. Voc.	-0.6471	4.41**	0.2090	0.21
Agr. Voc.	0.2549	0.87	-0.7048	1.04
Med. Voc.	-0.7837	0.54	0.3934	4.17**
Other Voc.	0.7715	2.59	-0.7179	0.66
20-24 Yr.	0.1338	0.15	1.2152	0.19
25-29 Yr.	-1.1257	10.92***	0.7348	0.10
30-39 yr.	-0.4473	4.01**	0.0239	0.54
Single	0.4692	3.73*	0.0905	46.96***
Local Unemp.	0.1182	0.32	-0.7497	0.98
Municipality	0.1004	0.13	-0.0906	12.37***
Big City	0.2448	1.53	-0.0228	0.01
Ind. Sector	-0.8184	0.41	0.0559	0.01
Serv. Sector	-0.3883	2.81*	0.1625	0.35
10-29 Persons	-1.2240	13.03***	-2.7672	39.82***
30-49 Persons	-1.2619	5.70**		
50-99 Persons	-1.1013	4.29***		
Over 100 Persons	-1.2843	8.40***		
Professional	0.0554	0.01		
Administrative	0.7126	1.19		
Clerical	-0.2534	0.66	0.0818	0.77
Sales	-0.2247	1.55	0.2721	0.18
Agr. and etc.	0.3366	6.11***	2.1518	98.63***
Employer	3.1524	7.51***	5.2265	12.59***
Own-account	0.0554	0.05		
Govnt. Employee	-1.3021	3.70*		
Num. Job Change	0.4063	4.24**	-0.6645	3.42*
Tenure	0.0135	1.10	0.0633	5.30***
Sample Size	5798			
-2 Log Likelihood	2158.14***			
Average of P1	3.4%			
Average of P2	4.8%			
Average of P3	91.8%			

***=p<0.01 **=p<0.05 *=p<0.10

P1 , P2, and P3 represent underemployment, unpaid family worker, and full employment, respectively.